

- Sub A1*
1. A composition for selectively etching a doped substance, said composition consisting essentially of:
- an alcohol and at least two inorganic acids.
- 5 2. The composition according to claim 1, wherein said alcohol is a polyhydric alcohol.
- 10 3. The composition according to claim 2, wherein said polyhydric alcohol is selected from the group consisting of ethylene glycol, propylene glycol, butylene glycol, dipropylene glycol, sorbitol, hexylene glycol, 1,3-dibutylene glycol, 1,2,6,-hexanetriol and 1,5-pentanediol.
- Sub B2*
- 15 4. The composition according to claim 2, wherein said polyhydric alcohol is selected from the group consisting of ethylene glycol, propylene glycol.
5. The composition according to claim 1, wherein said alcohol is propylene glycol.
- 15 6. The composition according to claim 1, wherein said alcohol is a C₂-C₆ alcohol.
7. The composition according to claim 6, wherein said C₂-C₆ alcohol is selected from the group consisting of ethanol, propanol, isopropanol, iso-butanol and n-butanol.

8. The composition according to claim 7, wherein said alcohol is
isopropanol.

~~SbD2~~ 9. The composition according to claim 1, wherein said inorganic acids
are selected from the group consisting of hydrofluoric acid, nitric acid,
5 phosphoric acid, sulfuric acid, boric acid, carbonic acid, perchloric acid and
sulfurous acid.

10. The composition according to claim 1, wherein said first inorganic
acids is nitric acid and said second inorganic acid hydrofluoric acid.

11. The composition according to claim 10, wherein said alcohol is
propylene glycol.

12. The composition according to claim 11, wherein said composition is a
non-aqueous composition.

13. The composition according to claim 1, wherein the ratio of alcohol to
a first acid to a second acid is from about 10-50:5-40:1.

15 14. The composition according to claim 13, wherein the ratio of alcohol
to said first acid to said second acid is from about 20-40:10-30:1.

15. The composition according to claim 14, wherein the ratio of alcohol
to said first acid to said second acid is about 30:20:1.

20 16. The composition according to claim 11, wherein the ratio of
propylene glycol to nitric acid to hydrofluoric acid is from about 10-50:5-40:1.

17. The composition according to claim 11, wherein the ratio of propylene glycol to nitric acid to hydrofluoric acid is from about 20-40:10-30:1.

18. The composition according to claim 11, wherein the ratio of propylene glycol to nitric acid to hydrofluoric acid is about 30:20:1.

5 19. The composition according to claim 1, wherein said substance etched is a doped amorphous, doped pseudocrystalline or doped polycrystalline silicon.

20. The composition according to claim 1, wherein said substance is doped germanium.

10 21. The composition according to claim 1, wherein said substance is gallium arsenide.

22. A composition for selectively etching doped silicon, said composition consisting essentially of:

a non-aqueous composition of an alcohol and at least two inorganic acids.

15 23. The composition according to claim 22, wherein said alcohol is a polyhydric alcohol.

24. The composition according to claim 23, wherein said polyhydric alcohol is selected from the group consisting of ethylene glycol, propylene glycol, butylene glycol, dipropylene glycol, sorbitol, hexylene glycol, 1,3-dibutylene glycol, 1,2,6,-hexanetriol and 1,5-pentanediol.

SAC B3

25. The composition according to claim 23, wherein said polyhydric alcohol is selected from the group consisting of ethylene glycol, propylene glycol.

26. The composition according to claim 22, wherein said alcohol is propylene glycol.

5 27. The composition according to claim 22, wherein said alcohol is a C₂-C₆ alcohol.

28. The composition according to claim 27, wherein said C₂-C₆ alcohol is selected from the group consisting of ethanol, propanol, isopropanol, iso-butanol and n-butanol.

10 29. The composition according to claim 28, wherein said alcohol is isopropanol.

30. The composition according to claim 22, wherein said inorganic acids are selected from the group consisting of hydrofluoric acid, nitric acid, phosphoric acid, sulfuric acid, boric acid, carbonic acid, perchloric acid and sulfurous acid.

15 31. The composition according to claim 22, wherein said first inorganic acids is nitric acid and said second inorganic acid is hydrofluoric acid.

32. The composition according to claim 31, wherein said alcohol is propylene glycol.

33. The composition according to claim 22, wherein the ratio of alcohol to a first acid to a second acid is from about 10-50:5-40:1.

34. The composition according to claim 33, wherein the ratio of alcohol to said first acid to said second acid is from about 20-40:10-30:1.

5 35. The composition according to claim 34, wherein the ratio of alcohol to said first acid to said second acid is about 30:20:1.

36. The composition according to claim 32, wherein the ratio of propylene glycol to nitric acid to hydrofluoric acid is from about 10-50:5-40:1.

10 37. The composition according to claim 32, wherein the ratio of propylene glycol to nitric acid to hydrofluoric acid is from about 20-40:10-30:1.

38. The composition according to claim 32, wherein the ratio of propylene glycol to nitric acid to hydrofluoric acid is about 30:20:1.

15 39. A composition for etching doped polysilicon from a silicon substrate with high selectivity to undoped polysilicon consisting essentially of:

a non-aqueous composition comprising propylene glycol, nitric acid and hydrofluoric acid in a ratio of propylene glycol to nitric acid to hydrofluoric acid is from about 10-50:5-40:1.

40. The composition according to claim 39, wherein the ratio of propylene glycol to nitric acid to hydrofluoric acid is from about 20-40:10-30:1.

41. The composition according to claim 39, wherein the ratio of propylene glycol to nitric acid to hydrofluoric acid is about 30:20:1.
42. A method for selectively etching a doped material comprising:
5 contacting said doped material with a composition comprising an alcohol and at least two inorganic acids.

43. The method according to claim 42, wherein said alcohol is a polyhydric alcohol.

44. The method according to claim 43, wherein said polyhydric alcohol is selected from the group consisting of ethylene glycol, propylene glycol, butylene glycol, dipropylene glycol, sorbitol, hexylene glycol, 1,3-dibutylene glycol, 1,2,6,-hexanetriol and 1,5-pentanediol.

45. The method according to claim 44, wherein said polyhydric alcohol is selected from the group consisting of ethylene glycol, propylene glycol.

46. The method according to claim 42, wherein said alcohol is propylene
15 glycol.

47. The method according to claim 42, wherein said alcohol is a C₂-C₆ alcohol.

48. The method according to claim 47, wherein said C₂-C₆ alcohol is selected from the group consisting of ethanol, propanol, isopropanol, iso-butanol
20 and n-butanol.

49. The method according to claim 47, wherein said alcohol is isopropanol.

50. The method according to claim 42, wherein said inorganic acids are selected from the group consisting of hydrofluoric acid, nitric acid, phosphoric acid, sulfuric acid, boric acid, carbonic acid, perchloric acid and sulfurous acid.

51. The method according to claim 42, wherein a first inorganic acid is nitric acid and a second inorganic acid hydrofluoric acid.

52. The method according to claim 51, wherein said alcohol is propylene glycol.

53. The method according to claim 52, wherein said composition is a non-aqueous composition.

54. The method according to claim 42, wherein the ratio of alcohol to a first acid to a second acid is from about 10-50:5-40:1.

15 55. The method according to claim 54, wherein the ratio of alcohol to said first acid to said second acid is from about 20-40:10-30:1.

56. The method according to claim 55, wherein the ratio of alcohol to said first acid to said second acid is about 30:20:1.

57. The method according to claim 52, wherein the ratio of propylene glycol to nitric acid to hydrofluoric acid is from about 10-50:5-40:1.

58. The method according to claim 52, wherein the ratio of propylene glycol to nitric acid to hydrofluoric acid is from about 20-40:10-30:1.

59. The method according to claim 52, wherein the ratio of propylene glycol to nitric acid to hydrofluoric acid is about 30:20:1.

5 60. The method according to claim 42, wherein said doped material is a monocrystalline material.

61. The method according to claim 42, wherein said doped material is a polycrystalline material.

10 62. The method according to claim 42, wherein said doped material is an amorphous material.

63. The method according to claim 42, wherein said doped material is doped polysilicon.

15 64. The method according to claim 42, wherein said doped material is doped germanium.

65. The method according to claim 42, wherein said doped material is gallium arsenide.

66. The method according to claim 42, wherein said doped material is BPSG.

67. The method according to claim 42, wherein said doped material is immersed in said composition.

68. The method according to claim 67, wherein said doped material is immersed in said composition at a temperature of from about -10°C to about 5 70°C.

69. The method according to claim 68, wherein said doped material is immersed in said composition at a temperature of about 35°C.

70. The method according to claim 42, wherein said doped material is sprayed with said composition.

71. The method according to claim 59, wherein said doped material is immersed in said composition.

72. The method according to claim 77, wherein said doped material is immersed in said composition at a temperature of from about -10°C to about 70°C.

73. The method according to claim 71, wherein said doped material is immersed in said composition at a temperature of about 35°C.

74. A method for etching doped polysilicon from a substrate with high selectivity to undoped polysilicon, said method comprising:

20 contacting said substrate with a non-aqueous composition comprising propylene glycol, nitric acid and hydrofluoric acid.

75. The method according to claim 74, wherein the ratio of propylene glycol to nitric acid to hydrofluoric acid is from about 10-50:5-40:1.

76. The method according to claim 74, wherein the ratio of propylene glycol to nitric acid to hydrofluoric acid is from about 20-40:10-30:1.

5 77. The method according to claim 74, wherein the ratio of propylene glycol to nitric acid to hydrofluoric acid is about 30:20:1.

78. The method according to claim 74, wherein said substrate is immersed in said composition.

10 79. The method according to claim 78, wherein said substrate is immersed in said composition at a temperature of from about -10°C to about 70°C.

80. The method according to claim 78, wherein said substrate is immersed in said composition at a temperature of about 35°C.

81. The method according to claim 74, wherein said substrate is sprayed with said composition.

15

Add
x2

Add
C4